Mechelecty

VOL. 19 NOVEMBER, 1960 No. 2

THE GEORGE WASHINGTON UNIVERSITY · SCHOOL OF ENGINEERING

THE GEORGE WASHINGTON UNIVERSITY

NOVEMBER 1960

This is an artist's concept of the world's biggest radio telescope

This giant telescope will use radio waves to locate objects that are billions of light years out in space. The dish-shaped mirror will be 600 feet in diameter—about the size of Yankee Stadium. It will be the biggest movable radio telescope ever known.

As you'd imagine, it is going to take a lot of material to build an instrument this size. The American Bridge Division of United States Steel, as a major subcontractor, is fabricating and erecting 20,000 tons of structural steel for the framework alone. The U. S. Navy through the prime contractor is supervising the entire job. When it's completed, there'll be a power plant, office buildings and personnel facilities for a permanent 500-man crew. The site is near Sugar Grove, West Virginia.

United States Steel produces many of the materials that are essential for construction: Structural carbon steel; high strength steels; alloy steels; stainless steels; steel piling; steel drainage products; cements; slag; reinforcing bars; welded wire fabric; wire rope; steel fence; electrical cable; and other allied products.

The most important building projects in our nation depend on steel. And *steel* depends on men like you. If you would like to find out about the many career opportunities at U. S. Steel, send the coupon.

USS is a registered trademark

United States Steel Corporation
Personnel Division, Room 6085B
525 William Penn Place
Pittsburgh 30, Pennsylvania

Please send me career information about U.S. Steel.

Name_____

School_____

Address_____

City_____ Zone____ State_____

USS **United States Steel**

preferably...
a big FISH in the right-sized STREAM

O

We've been told frequently that engineering graduates are attracted to a company our size because of an honest and understandable desire to be "a big fish in a little pond". Perhaps others prefer to think of the future as the challenge of "swimming up-stream".

We believe that Sikorsky Aircraft is actually the "right-sized stream" for young engineers who would enjoy diversified, small-group activities, as well as stature opportunities in a field that is not limited nor professionally confining. Sikorsky Aircraft is the company which *pioneered* the modern helicopter; and our field today is recognized as one of the broadest and most challenging in the entire aircraft industry.

Because of this, we can offer stimulating experiences in an ideal environment. Work associations could include joining an *electronic* team of twenty to thirty associates—or—working with a highly selective group of four or five on interesting problems of *radiation*, *instrumentation*, *auto pilotage*, *automatic stabilization*, etc.

And what of your future?

That, of course, involves your own potential for growth. As a far-sighted company, we're more than willing to help you meet the challenge of "going up-stream"!

For factual and detailed information about careers with us, please write to Mr. Richard L. Auten, Personnel Department.

SIKORSKY AIRCRAFT

DIVISION OF UNITED AIRCRAFT CORPORATION

STRATFORD, CONNECTICUT

Queen Helene

See page 14

Mechelectiv

VOL. 19 NOVEMBER, 1960 No. 2

ARTICLES

THE SIGNIFICANCE OF WIRELESS DURING THE *TITANIC* TRAGEDY
by Donald C. Lokerson 5

NAVY'S 2,000,000 WATT VLF STATION NEARS COMPLETION
by Larry C. Hice 7

DEPARTMENTS

EDITORIAL PAGE 4
WHAT'S NEW 9
MECH MISS 10
CAMPUS NEWS 14
FACULTY PAGE 19
TECH NEWS 21
TENSION BUSTERS 24

Published at the George Washington University by direction of the Engineers' Council. Published six times during the school year in October, November, December, March, April, and May. Entered as second class matter March 6, 1951, at the Post Office at Washington, D. C., under the act of March 3, 1879. Address communications to Mechelectiv Magazine, Davis-Hodgkins House, George Washington University, Washington 6, D. C. or telephone FEderal 8-0250, Extension 528.

Subscription Price: Two Dollars

CHANGE OF ADDRESS: Send your new address at least 30 days before the date of the issue with which it is to take effect.

Editorial Page

INVITATION EXTENDED

In Past years student written articles have come exclusively from the School of Engineering. Because of this limited source, we, the editors of MECHELECIV, feel that the magazine has been lacking in color and variety. In an effort to alleviate this problem the MECHELECIV is extending an invitation to students in all university departments to submit articles for publication.

Many attributes will be gained by expanding the scope of the magazine. With a larger selection of material available for publication the staff can achieve the desired variety of content, length and style. The engineering sciences are not, by any means, divorced from the physical, natural or behavioral sciences. The accumulation of these sciences and allied subjects in one magazine will offer a "change of pace" and increase the magazine's appeal to more students.

MECHELECIV will attempt to provide a balance of informal and formal articles. Informal articles can be understood and enjoyed by all. Formal presentations, such as student competition entries and outstanding proseminar papers, will be published for they reflect the highest level of professional achievement of the students within this university.

MECHELECIV has, and always will be a magazine dedicated to engineering and the allied professions. It is this university's only student sponsored publication for use by technically inspired writers. Responsibility for its technical content is yours. Whether your article is a product of a seminar class, English composition class, departmental requirement, student competition or your own employment, the MECHELECIV is for your use.

Part I -- The Significance of Wireless During The Titanic Tragedy

By Donald C. Lakerson E.E. '62

During the past half century, radio has grown from an interesting phenomenon to one of the most useful means of communication yet invented. Radio has become famous for its life-saving capabilities. Not until the Titanic disaster had become history, were the chaotic laws and customs of radio modernized and expanded to meet the growing needs of wireless communication. The chain of events which occurred from April 14, 1912, until the rescue ship Carpathia docked on April 18, are typical of dozens of similar disasters that have plagued the shipping lines to this day. By reviewing the highlights of the part wireless played in saving the 675 survivors of the Titanic, I hope to show the basis for changes made in radio laws after 1912, and try to determine how the disaster helped mold the foundation of present-day radio laws and practices.

Early in 1908, the White Star Company announced plans for the largest vessel in the world to be named the Titanic. In 1909, the keel was laid and the ship was launched on May 31, 1911. The ship was completed in February of the next year at Belfast, Ireland. Captain E. J. Smith took the 882-foot luxury liner for trial runs and then proceeded to her Southampton dock. On Wednesday, April tenth, she eased away from her dock with 1,926 passengers and 860 crew members on her maiden voyage to New York.

Many prominent people were aboard. Charles Hayes of Pacific Railroad fame; the world's two richest men, Colonel Astor and Benjamin Guggenheim; President Taft's military aid, Major Butt; and the president of International Mercantile Marine, Mr. Ismay, were among the passengers on the Titanic.

Less prominent, but equally important during the cruise, were the two telegraph operators on the Titanic. The senior operator, J. A. Phillips, was a native of Godalming, England. After joining the Marconi School at Liverpoole, he became one of the most expert wireless operators in the ship service. He had been employed on the Oceanic four years before being transferred to the Titanic at the age of twenty-four. The junior operator, clerical helper and messenger, Mr. H.S. Bride, was twenty-one years old when he began working on the Haverford in 1911. He was transferred to the Lusitania and then to the Titanic.

A modern ship deserved modern radio equipment on board. Directly aft of the bridge on the Titanic, three cabins were used for the wireless equipment. One room contained dynamos, spare batteries and part of the wireless transmitter. A room opening onto the boat deck was the operating cabin, which contained the radio receiver and key. The wireless operators used the third cabin for sleeping quarters. A curtained doorway connected these quarters with the operating room. The transmitter was the latest model, using a magnetic detector -- a new invention which made signals easier to read. The antenna consisted of four parallel wires strung between the two teak mast-tops. The five-kilowatt Marconi transmitter could be powered by the regular ship's generators, the ships emergency power, or independent storage batteries. This transmitter had a normal range of four hundred miles under average conditions. At night and under exceptional conditions, the ship could communicate up to two

—Continued next page

As a native Washingtonian, Donald Lakerson is right at home as a Junior in the Bachelor of Electrical Engineering curriculum. This year his main extra-curricular activity is acting as Chairman of the AIEE-IRE Joint Student Branch here at G.W.U.

For the past several summers he has installed and repaired marine electronic equipment on yachts, and adapted and maintained receivers for a fire department. Last year he was one third of a team which first demonstrated the feasibility of radio communications via signals bounced off the ionization trail of an orbitol body. As a result of this he is now a technical advisor for the Volunteer Satellite Tracking Agency.

In 1955, he became interested in electronics while at Bethesda-Chevy Chase Senior High School. Soon after receiving his amateur radio license, he learned of the efficient monitoring system used by the Federal Communications Commission to spot defective transmitters. He promptly became more than just aware of radio laws and regulations. For his English II term paper, he traced the origin of almost all the basic regulations to one major disaster-the sinking of the Titanic.

thousand miles away. By international agreement the two frequencies used for all the radio services were three hundred and six hundred meters. Three hundred meters was used for non-emergency messages, while six hundred meters was for calling and distress.

Until April 13, 1912, the wireless operators' job was normal and uneventful. That Saturday night, part of the transmitter broke down, and the two Marconi men spent over six hours repairing the damage.*

Later the same day, Mr. Bride relieved Mr. Phillips. A few hours later, the assistant operator heard an ice report directed to the Titanic, from the Californian. Since he was busy recording the messages sent that day, he delayed his confirmation of the report. It was customary to leave the rotory power supply off when not in use, to prevent excessive wear. Bride saw no need for a prompt reply, so he waited until he was ready to send other messages to the Californian. Following accepted procedure, this ice report was taken to the bridge of the Titanic.

At nine o'clock on the morning of April 14, (Titanic time) the steamship Caronia had sent: "Westbound steamers report bergs, growlers, and ice field" slightly southwest of the Titanic's position. This was reported to the bridge. When Phillips resumed the operating position at 1:42 p.m. (Titanic time), the Greek steamer Athenai reported icebergs even farther to the West and South. Three minutes later the German ship Amerike relayed an ice report via the Titanic to the Hydrographic Office in Washington, D.C. This message should have been relayed to Cape Race Telegraph Station, and Bride should have taken a copy to the bridge officers, but no evidence has been found to indicate that it ever was mentioned to anyone by Phillips (who perished). Bride testified that he never saw the message. The report was probably put aside until the Titanic was due to call Cape Race about eight-thirty that evening. Five large icebergs were reported by the Antillian at about seven-thirty. They were fifty miles West of where the collision was to occur five hours later. At nine-forty that night, another report was received from the Mesaba, but this message never reached the bridge because Bride was talking to Cape Race. Titanic's passengers' personal messages were being relayed. After Phillips relieved Bride, the Californian told the Titanic: "We are stopped and surrounded by ice." Phillips replied, "Shut up! I'm busy. I am working Cape Race." Bride was asleep in the adjoining cabin during this report.

At about ten o'clock (Eastern Standard Time) that evening, Mr. Phillips noticed that the engines had stopped. He left the cabin momentarily. Bride awoke. When Phillips returned, he reported that "Things looked queer". He thought the ship might have struck something and they were probably going to return to England. Just as the Chief Operator was about to retire, the Captain came into the cabin.

He reported, "We've struck an iceberg and I am having an inspection made to tell what it has done to us. You had better get ready to send out a call for assistance; but don't send it yet." Ten minutes later the Captain returned, saying: "Send the call." He reappeared in a few minutes and asked: "What are you sending?"

Phillips replied, "The C. Q. D."

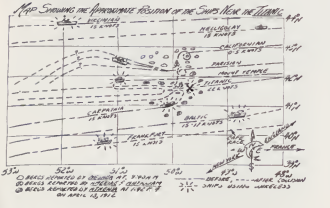
"Send the S.O.S." Bride said jokingly, "It's the new call and it may be your last chance to send it."

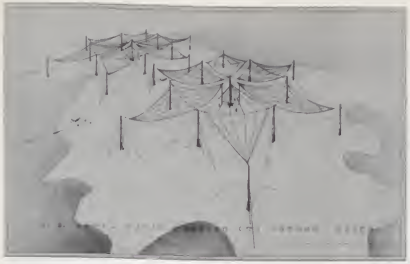
Phillips seemed cool and clearheaded, with good and steady sending, when the La Provence and Cape Race received the distress message at 10:25 that night. A few moments later the Mount Temple heard Phillips tap out their position. Three minutes later the Ypiranga heard the C.Q.D. Some sources say the Frankfurt was the first to reply and then the Carpathia reported they received the message and would come to the Titanic's assistance. At 10:36 EST the Titanic gave its new position as 41.46°N. and 50.14°W. The 45,328 ton luxury liner had coasted a few miles before coming to rest. Every few minutes Bride was sent to the bridge with messages. Meanwhile, Phillips radioed: "Require assistance. Collided with iceberg. Cannot hear for noise of steam." The boilers were being "blown off", that is, the pressure was being lowered to atmospheric pressure by releasing the steam through the two engine room smokestacks. This noise was so loud that it was impossible to hear telegraph signals even with the cabin door closed.

The Titanic asked the Frankfurt's wireless operator to tell his captain to come to their aid. By 10:46, the Prinz Fredrick Wilhelm and the Mount Temple reported their positions to the Titanic, but they were unable to navigate the ice fields. During the next hour, many ships reported their positions to the Titanic, as required by law. A few of these were the Virginian, the Baltic, the Coronia, the Asian, and the Olympic. Many of the coast telegraph stations reported very bad radio static conditions at the time when these calls were being made.

—Continued on page 16

*A lead, from the secondary of the power transformer used to make the spark, grounded to the mounting bolts. They finally repaired the wire and wraped it with rubber tape.





Navy's 2,000,000 Watt VLF Station Nears Completion

By Larry C. Hice E.E. '62

With the advent of the Nuclear submarine fleet capable of striking nearly any target on earth with atomic missiles, the Navy decided to build a giant trigger to command its mighty Polaris submarine pickets. The trigger will be a two million watt transmitting station on the northernmost rockbound coast of Maine.

A truly monumental task is near completion. By January the world's most powerful transmitting station will be ready for proof of performance. The magnitude of the Navy's request to communicate with submerged vessels may not be immediately apparent.

We are in an age that our thinking has been dominated with miniaturzation, light high-strength alloys, space travel, heat and shock resistant materials, and the complexity of data processing techniques. The realm of underwater communications is a different world—one of brute force techniques and monsterous proportions. It is true that a space probe beyond the sun can transmit a signal back to earth with only a few watts; but millions of watts at these frequencies would not penetrate the surface skin of the ocean. Through the use of Very Low Frequencies (14 to 30 kilocycles) we are indeed able to drive a signal to its receiver several feet below the surface of the ocean.

It may well be that nuclear submarines and Polaris missiles will be the Navy's major contribution as a deterrent to war. They have proven their ability to navigate under a solid cover for several days undetected. Each submarine is capable of delivering 16 nuclear warhead Polaris missiles with long range accuracy without surfacing. The Navy's network of VLF transmitting stations can give navigational assistance to its submarine pickets thus offering an inevitable threat to any potential enemy; or it can command the full destructive forces to a given target.

The artist's conception (above) is now a reality! The dual array is presently undergoing performance tests. Each star is supported in its center by a 1000 foot tower. The six intermediate and six outer towers are 875 and 800 feet high respectively. The stars measure 6200 feet from point to point. The array covers an area of 715 acres—equal to the area of 22 Pentagon buildings side by side. The Washington Monument would be dwarfed by the giant towers. Over 2,000 miles of wire covering an area of 3,000 acres has been buried about a foot beneath the surface of the peninsula. In some areas, immediately under the tophat for instance, there are as many as 6 radials per degree. There is a huge helix house at the base of each center tower. Since displacement currents are returned to the helix house, the immediate vicinity of the helix and the center towers is almost solid copper. There is a 25,000 square foot transmitter building midway between the two center towers. The transmitter building, as well as the two helix houses, are lined with solid copper. Power is delivered to the helix houses by

—Continued next page

Larry's familiarity with the VLF Cutler antenna is no accident since he was actively engaged in the design, high voltage testing, production testing, and inspection of the primary insulation at the John Lapp High Voltage Labs in LeRay, N.Y. He was also engaged in the model development program at Leesburg, and field measurements on location in Maine. Larry yields himself to high voltage design and testing. He missed one semester to accept a 600,000 volt field job after but says he wouldn't miss school again for a million volts.

He is an engineer at DECO where he has been employed since graduating from Valparaiso Technical Institute in 1952 except for a 2 year military leave. He has worked there on a part time basis since entering GW in 1957. He is a member of the joint student branch IRE-AIEE, MECHELECIV Editorial Staff, Technicial Staff of WRGW, and Theta Tau.

Aside from school and work, Larry lives with his wife in nearby Virginia. He served 3 years as a deacon in his church. His other principle interests include prospecting for, collecting, and cutting gemstones.

two, buried six foot diameter coaxial transmission lines. A one-half inch copper bus around the shore is common to the radial ground system. Outward from the shore bus there are 250 sea terminals of 6 inch stainless steel tube reaching well into the sea.

One insulator assembly weighing 7½ tons in position for 800KV flashover testing. Stainless steel cones at each end provide near equal voltage distribution over the 75' length.

Primary insulation alone weighs 360 tons! One insulator assembly is 70 feet long and with its 15 and 20 foot stainless corona shields weighs 7-1/2 tons. There are 48 insulator assemblies at the tops of the 26 towers in the array; one at each outer tower, two at the intermediate towers and six at the center towers. Maximum tension on each halyard at peak wind load is 55 tons. Electric hoist at each tower make it possible to raise and lower each panel individually. Each panel is counterweighted at all towers, except the center one, by 220 ton iron aggregate weights. When wind or ice loads the panels, barrel shaped counterweights roll on 100 foot stub towers at the base of the supporting towers. The entire system is designed to withstand a wind of 172 miles per hour and 3 inches of radial ice. Sixty cycle de-icing current can be supplied to all tophat wires of one star while the other is in operation. There are approximately 30 miles of 1 inch diameter calsun bronze cable in each star. Up to 6 megawatts of power can be supplied for de-icing. Power for de-icing, transmitter input, tower lighting and station utility outlets are supplied by an 11 million watt diesel power plant located on the peninsula. Maximum tophat voltage will be in the order of 300 KV. Current in the downleads will be up to 600 amperes. The transmitter has four final amplifiers of 500 KW each. All four in parallel supply 2 megawatts of RF power to the antenna. The final tubes are 2 feet high.

The Cutler station, NAA has been five years in the making. It all began when the Navy started searching for companies equal to the task. Continental Electronics Manufacturing Co., now a division of Ling-Temco of Dallas, Texas, received the prime contract. Prime contractor's responsibilities included design, manufacture, construction and installation of the transmitter. Design on the antenna and ground system was contracted to Developmental Engineering Corporation (DECO) of Washington, D.C. and Leesburg, Virginia. Both Continental and DECO have gained an international reputation in the field of super power transmitters and radiation systems including several Voice of America stations throughout the world.

DECO, primarily engaged in the design of the radiation system and coordination and direction of the various phases thereof, subcontracted a number of companies and individuals throughout the country that looked like a book of Who's Who. Primary insulation design and manufacture was done by the Lapp Insulator Company of LeRoy, N. Y., a world leader in power and radio insulation. Smith Electronics of Cleveland, Ohio immediately sent a team of men to Maine to select a site for the giant antenna and gather necessary data for the ground system design. Mechanical considerations were kept in pace with the electrical design by Robert's Associates, Architects and Engineers of Atlanta, Ga. Harold Wheeler of Wheeler Labs, Donald Watt of National Bureau of Standards and James Wait of Naval Research Labs, all world authorities on radio physics and VLF phenomena, were added to the consulting staff of DECO. Every detailed phase of design was sifted through this consulting group for final approval after exhaustive measurements and severe tests of reliability had been carried out.

One could not condense from the volumes and volumes of data that were taken a fair measure of the effort that went into the design of NAA. If there is a key word in VLF radiation system design it would be "efficiency."

The Trideco radiation system will achieve an unprecedented 50 percent efficiency—nearly twice that realized by any other previous design. A few percent efficiency are hard to buy at very low frequencies. They cost lots of effort to get for the least dollars. Nothing is too trivial to consider as a means of conserving one percent of power or one percent of cost for a two million watt VLF transmitting station. Each additional one percent efficiency means an additional 20,000 watts radiated, and one percent cost reduction means a $700,000 savings.

Following are only a few examples of the effort spent to assure that NAA has an efficient radiation system which will be mechanically, electrically and economically sound.

DECO modeled on a 100 to 1 scale every existing configuration of VLF radiation system. Complete electrical data that could be used to relate efficiency vs. cost were taken from these models. The prime factors of this relationship are: effective electrical height, radiation resistance, capacitance and antenna Q. For each model these measurements were made at various heights and various tophat conductor distributions, with and without metal towers, with and without guys, with guys grounded and ungrounded, with towers grounded and ungrounded, with X number of towers, Y number of guys and Z number of wires in the tophat. A comparison of these basic designs with a common reference soon lead to the criterion of design. Model work finally lead to the six pointed star now known as the Trideco design.

A special model range was built for further development of the Trideco. Everything must be

—Continued on page 18

WHAT'S NEW

Edited by Bob Underwood

NEW STANDARD OF LENGTH

The world has adopted a new international standard of length — a wavelength of light — replacing the meter bar which had served as the standard for over seventy years. The action was taken October 14 by the 11th General Conference on Weights and Measures meeting in Paris. Other actions taken by the Conference included the establishment of a central facility for international coordination of radiation measurements and confirmation of a new definition of the second of time.

The new definition of the meter as 1,650,763.73 wavelengths of the orange-red line of krypton 86 will replace the platinum-iridium meter bar which has been kept at Paris as an international standard for length since 1889 under the Treaty of the Meter.

While not of great concern to the man in the street, this development is of great importance to those engaged in precision measurement in science and industry. For many years the world has relied on a material standard of length — the distance between two engraved lines on the International Meter Bar kept at Paris. Duplicates of this standard were maintained in the standards laboratories of other countries of the world. From time to time it was necessary to return these duplicates to Paris for recalibrations, and occasionally discrepant results were obtained. Also, there was doubt in the minds of some scientists regarding the stability of the international meter bar. The new definition of the meter relates it to a constant of nature, which is believed to be immutable and can be reproduced with great accuracy in any well-equipped laboratory. Thus it is no longer necessary to return the national standards to Paris at periodic intervals in order to keep length measurements on a uniform basis throughout the world.

The question naturally arises -- How can light waves, a form of energy, be used to measure length, a physical quantity? Light is a visible form of radiant energy emitted by atoms and propagated as waves. Two light waves, if they have the same wavelength and are travelling in the same direction, may interfere with one another. If the waves are superimposed their energies will be combined, and a brighter illumination will result. However, of one wave trails the other by one-half wavelength, the two will cancel, and darkness will result. If two similar light rays are out of phase by as little as 1/10 wavelength, interference will result. Optical measurement of this interference, together with a knowledge of the wavelength, permits extremely accurate determination of length. The interferometer is the device used to measure the meter by means of light waves. Using an interferometer, one can measure down to the fractional part of a wavelength the distance by which a meter bar differs from the standard meter as defined by krypton-86 wavelengths.

The new definition of the meter will not materially change the measurement of length nor in any way the relation between the English and Metric units. Careful experiments performed independently in the United States and Canada confirmed that the wavelength standard and the metal standard are in satisfactory agreement. They show that the distance from a point in New York to a point in Washington would be altered by less than three inches, as measured in terms of the old and new standards. The inch now is equal to 41,929.399 wavelengths of the krypton light.

By adoption of the new definition, the standard of length which has been used by spectroscopists for many years is brought into agreement with that used in other branches of science, thus increasing the unification of systems of measurement throughout the scientific world. Although it is recognized that the new definition may have the effect of shortening the meter, the amount of shortening will be less than 1/5000th of the thickness of a well worn dime.

THETA TAU

MECH MISS

Karen Dixon

Pretty, brown-eyed Karen Dixon was chosen Mech Miss for November by Theta Tau. She is an 18 year old freshman in the Junior College of Arts and Letters. She graduated from Anacostia High School here in Washington. Karen's hobbies and interests are directed toward competitive and aquatic sports and travel. Her athletic interests are combined beautifully with all the character of feminity. Karen is a Delta Gamma pledge. Next year she may try for a cheerleader's spot.

Thomas O'Connell (B.S. in M.E., Notre Dame, '54; M.B.A., New York University, '60). Recently, as part of his job in marketing at IBM, he found himself assisting the customer technicians with the design problems of one of the world's busiest bridges.

WHAT'S AN IBM MAN GOT TO DO WITH REDESIGNING A BRIDGE?

Tom O'Connell is an engineer working in marketing areas as an IBM Data Processing Representative. His job is to introduce management to the advantages of electronic data processing. Once they have acquired an IBM system, he acts as a consultant on new uses for the system.

A Spectacular Engineering Achievement. How is he helping to redesign a bridge? One of his clients is the agency which constructs and operates transportation facilities in the New York-New Jersey area. Recently, they began to add a lower deck to the George Washington Bridge. It has been a spectacular engineering achievement. Sections were brought up the Hudson River on barges and hoisted hundreds of feet into position. All this while heavy traffic continued in both directions.

This double-decking of one of the world's busiest bridges took complex planning. An IBM system materially aided in the verification of bridge design calculations and in suspension bridge truss analysis under various loading conditions. Tom O'Connell supplied many of the computer programs that were used in conjunction with other programs developed by the customer. Tom now knows a lot more about the problems of bridge design.

A Job That Makes News. One of the exciting aspects of Data Processing Marketing at IBM is this wide diversity of systems application. Using the knowledge a man has gained in college, and backed by the comprehensive training he receives at IBM, he moves into many kinds of application areas. The areas are always interesting, sometimes newsworthy. In fact, almost every day newspapers carry stories about new applications of computer systems in important areas of business, industry, science and government.

If you would like to find out in more detail about the many kinds of marketing opportunities at IBM, our representative will be visiting your campus soon. He'll be glad to sit down with you and discuss the reasons why marketing is a career with a virtually unlimited future. Your placement office can make an appointment. Or you may write, outlining briefly your background, to:

Charles B. Finley
IBM Corporation
425 Park Avenue
New York 22, New York

IBM®

You naturally have a better chance to grow with a growth company.

CAMPUS NEWS

Miss Helene Harper was crowned the 1960 Homecoming Queen at the opening of homecoming festivities here. Miss Harper, former Mech Miss (April 1960) and reigning Engineering Queen was sponsored by the School of Engineering.

Five dollars is being offered by MECHELECIV to any student at the university, who writes a feature article, which is accepted for publication. The article may be concerned with engineering or with any allied field which influences engineering, e.g., chemistry, geology, archeology, etc. Students interested in submitting an article for consideration should contact the editorial staff, FEderal 8-0250, Extension 528, or bring the article to the MECHELECIV office, Davis-Hogdkins House.

At the November 2 meeting of the ASCE the speaker was Mr. Varela, a field engineer for Atomic International. His speech on Power Reactor Construction was supplemented by two films, which explained the function and operation of power reactors. The guest speaker for the ASME meeting was Dr. Franklin, a metallurgist at the Bureau of Standards, who discussed the phenomena of Brittle Fracture and Plastic Flow. Mr. Hocking of NASA's Goddard Space Flight Center spoke at the IRE-AIEE student chapter meeting. His topic was Digital Recording Systems for Tracking Satellites. Students, who are not members of one of the engineering societies and are interested in their activities, may inquire about membership at one of their monthly meetings. The society meetings are usually held on the first Wednesday of every month. Any further information concerning dues, benefits, etc., may be found in the Engineer's Guide.

The Engineers Council elections for the coming year for the two freshmen representatives and the junior representative were held on October 24. The newly elected members of the Engineers council are:

Raghu Chari - Freshman
Harvey Harrison - Freshman
Arthur Macurdy - Junior

February graduates should keep in mind the Graduate Record Exam on December 10. All candidates for Bachelor's Degree are required to take two parts of this examination.

Record-breaking Atlas missile billows flame and vapor as she launches satellite into orbit.

130 tons of missile with a skin thinner than a window pane!

The Nickel Stainless Steel skin of the Atlas missile is actually about one-third as thick as the glass in your window.

And yet look what this skin does:

- It is the sole structural framework for Atlas—130 tons of dead weight at the moment of firing.
- It serves as the wall of the propellant tanks in Atlas' weight-saving design.
- It withstands the deep chill of liquid oxygen (—297°F) . . . the high heat of supersonic speed (400°F-600°F).

. . . and it is less than 1/25 of an inch thick!

No wonder they call stainless the space-age metal. No wonder engineers turn more and more to Nickel Stainless Steel as temperatures rise . . . as speeds soar . . . as demands get more and more severe.

But space is only *one* of the new worlds science is penetrating, and not even the newest. Witness man's 35,805-foot dive into the depths of the Marianas Trench in the Pacific. Or his exploration of deep cold. Of super pressures. Of ultrasonics.

Before the manipulation of such new environments can even be considered, scientists and engineers need to know exactly what happens to metals under extreme conditions.

Inco Research a source of such data

Quite often, Inco Research has already developed the information needed and has it neatly filed and cross indexed. Ready for use. In several instances, when a new alloy was needed, barrier breakers have found it already developed and tested by Inco Research.

Remember Inco Research when, in the future, you encounter severe new conditions and need useful data.

The International Nickel Company, Inc.
New York 5, N. Y.

INCO International Nickel

The International Nickel Company, Inc., is the U.S. affiliate of the International Nickel Company of Canada, Limited. (Inco-Canada)—producer of Inco Nickel, Copper, Cobalt, Iron Ore, Tellurium, Selenium, Sulfur and Platinum, Palladium and Other Precious Metals.

Meanwhile, the passengers on the sinking vessel were being put into life boats in a very unsystematic manner. Many boats had no men in them to row, so inexperienced women had to do their best. Most boats were far from filled when they were lowered. At this time Bride was having a difficult time getting through the crowds on the boat deck, while he was acting as messenger between the wireless cabin and the bridge. He was busy giving the Captain latest reports for his consideration.

At 11:45 on this calm Sunday night, Phillips reported to the surrounding ships, that "The engine room is flooding." The Frankfurt broke in and wanted to know what the trouble was. Phillips replied, "You are a fool, keep out." Phillips did not waste time telling him the Titanic was sinking. Apparently the Frankfurt operator did not know that C.Q.D. and S.O.S. meant there was a disaster at sea. Five minutes later the Carpathia heard their last message from the great ship. "Water up to boiler", said Phillips as he struggled to keep the transmitter running off the ship's weakening power supply. The Virginian heard the last wireless signals from the Titanic at 12:10 p.m. The Chief Operator could not be sure the transmissions were getting out because he could not hear the "crackle" of the voltage at the antenna. Both operators put on life jackets, then Phillips returned to the transmitter.

Meanwhile, Bride went to the adjoining cabin, where he gathered up their money and other small articles. Phillips was so completely absorbed in his work, that he did not notice a stoker was gently removing his life jacket. Bride returned and leaped upon the man. The three men wrestled for some time, but the stoker was finally knocked out.

The Captain reappeared and told the operators to look after their own lives, they had done their duty. Phillips returned to the transmitter for one more fruitless try, while Bride gave an unconscious passenger some water. As the sea began to lap the boat deck, Bride sprang to the aid of men trying to launch the last collapsible life raft. Phillips walked aft to join the crowd assembled there. Just as the men succeeded in getting the raft to the edge of the deck, a large wave rolled across the deck, carrying Bride and the boat to which he clung, a few feet from the listing Titanic. When the wireless operator managed to climb on top of the raft, he found it was upside down. The next moment, the guywires to the forward smokestack broke, sending the gigantic cylinder crashing into the water, inches away from the raft on which Bride was sitting. The resulting wave propelled the boat a good hundred and fifty feet away from the sinking liner. Many swimmers crowded aboard the small craft, until those on board felt more weight on the craft would sink it. Bride managed to kneel on the boat for four long hours before their rescue. Some of the survivors sat on Bride's feet, crushing his ankles and causing frostbite from lack of blood circulation in his legs. The Chief Operator reached the same raft, but the cold, worry and lack of sleep killed him by daybreak. He suddenly slipped into the water that covered the bottom of the small craft.

When the Carpathia arrived, Bride was dragged aboard and taken to the hospital. Phillips body was probably taken aboard but given a sea burial. Bride was in the hospital until someone suggested he relieve the wireless operator, 21-year-old-Harold Thomas Cottam, who looked "queer" and who had fallen asleep at the key. Bride went to the wireless room on crutches at about six o'clock (EST), and never left that room until they reached New York. Cottam had tried to send a list of survivors at 4:30 that Monday afternoon, but the hundred and fifty mile range of the wireless set was not enough.

At about 4:15, Monday, the Canadian Government Marine Agency received a message reporting the Titanic in tow to Halifax, and passengers being transferred to the Carpathia. Thus messages became mixed up and garbled because of needless interference caused by radio amateurs, public and private stations. For two days the world had been comforted by false radio reports.

During the trip to New York, a Navy ship was sent toward the Carpathia to get a list of survivors for President Taft. He wanted to know if Major Butt had been saved. Bride was operating when they made contact with the Chester. He claimed that the Navy's wireless operator was inexperienced in sending International Morse Code, and that he was too slow to bother with. Crowded frequencies still hampered wireless messages from the survivors, so President Taft proclaimed that all stations should stop sending until the Carpathia's wireless messages had been received. Some of the reports that had been received reported that all Titanic's passengers were safe. In London, a report that Phillips was safe proved to have been from his uncle who was on another ship.

Soon after the Carpathia reached port on Thursday night, a Senate Hearing was held and some months later the British Parliament held an inquiry. The American investigation was held while the accident was fresh and horrible, while the British inquiry was a sober study of events. The American investigators were avenging while the English investigators were a vindicating body.

* * * * * * *

This is the 1960 Bethlehem Loop Class

(Will you be here in 1961?)

In early July, 1960, 202 college graduates reported to our general offices in Bethlehem, Pa., for an intensive period of indoctrination. For five weeks they attended talks by top management, viewed Bethlehem films, visited steelmaking operations almost daily. Upon completion of this first phase of training every man had a sound, basic knowledge of our large and diversified organization.

Then began the second phase of Looper training—within their individual areas of specialization. Some of these men are now in the third phase—actual on-the-job training. All of them can be sure that, training completed, they are well-prepared to pursue rewarding careers with a company that is moving ahead steadily.

Many types of engineering graduates are represented in our 1960 Loop Class—mechanical, metallurgical, chemical, electrical, civil, industrial, mining, ceramic, and others.

Whatever your engineering curriculum, chances are there's a splendid opportunity for you with Bethlehem Steel—the nation's second-largest steel producer, manufacturer of many finished products, the world's largest privately owned shipbuilding organization, and fabricator and erector of steelwork for buildings, bridges, and other steel structures.

Ask your Placement Officer about Bethlehem.
And be sure to pick up a copy of our booklet, "Careers with Bethlehem Steel and the Loop Course."

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

Steel — *for Strength . . . Economy . . . Versatility*

BETHLEHEM STEEL

BETHLEHEM STEEL

modeled to scale now; the wire size, guys, insulators, corona rings, helix houses, downleads, and even the sag in the tophat. The detailed model stretched over about a quarter acre. Electric field distribution was measured at two foot intervals or less. Ground return current magnitude and direction was measured every two feet. In the vicinity of towers and guys earth currents were measured every 6 inches on 30° radials. Complete electrical performance data were obtained from the model. Factors relating to efficiency were measured so as to determine it to within 1.0 percent. Loss in towers and guys due to displacement currents were measured with the same degree of accuracy. From these model data and the data obtained by the site selection and survey team in Cutler, the electrical performance of the full scale system was predicted.

The desired efficiency could be realized from the model in a Virginia meadow. How would our model perform on the coast of Maine though? How much will the losses increase when the ground is frozen or covered with a foot of snow? How much will insulator losses increase when ice forms or salt spray and salty fog contaminate the porcelein? How much loss can be contributed by a change in earth and vegetation? What areas should be cathodically protected? How much increase in radio noise and corona be expected if the construction crews leave sharp burrs on a nut or nick the cable in the tophat assembly? Hundreds of questions such as these were necessarily answered. Every potential source of radio noise, corona and contamination of each part of the radiation system was studied and remedied well in advance of construction. Climatic conditions of past decades were studied. Wires were buried in various earths, insulators were placed at various places on the peninsula, Ph factor was recorded and a dozen other tests were conducted on location in Maine to study the effects of severe climate.

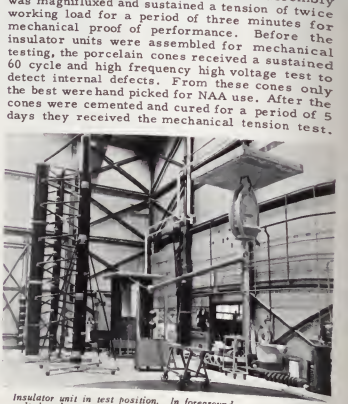
The site is a peninsula of about 3000 acres bounded on three sides by salt water. It is now stripped of its vegetation and rocks. Its peat bogs were drained and filled. Efficiency had been gained everywhere possible but exhaustive tests proved that the top two feet of soil must be void of any rocks in excess of 12 inches diameter and all natural vegetation to gain the desired efficiency. This in itself was a monumental task since the peninsula had a grand assortment of Maine cover. The maximum tophat voltage will be about 300,000 volts. At voltages of this magnitude extreme care must be taken to prevent corona and radio noise. A small unshielded burr anywhere in the tophat assembly could result in corona which is a loss of power for one thing and a source of noise for another. For this reason every square inch of tophat assembly was carefully inspected before it was raised into position. The construction crews handled cable and hardware as if it were glass.

The rigorous design and exhaustive production tests of the primary insulation is only another example of the care that was taken with each and every component in the radiation system before the final stamp of approval was received.

To simulate severe "ICE-UP" insulator unit was held at a temperature of 250-320F for 36 hours while 32o "rain" was applied.

The grading rings on the insulator assembly provide a near equal voltage drop across each of the 16 units. They provide also a corona free termination to the tophat and tower. Although tophat voltage would not normally exceed 300KV the assembly has a flashover potential of 820 KV dry and 600 KV while being drenched with water.

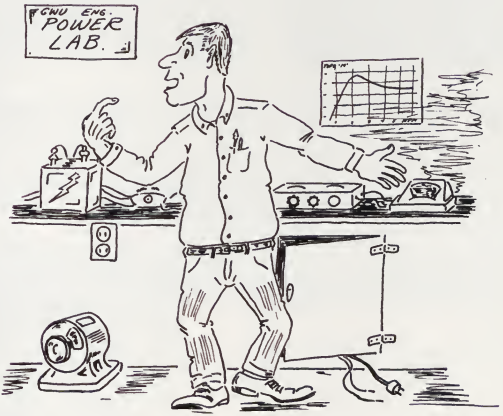
Two of each tension member of the assembly were selected at random from the first production lot and held in tension for 3 minutes at 50,000 pound intervals to 400,000 pounds while deformation was gauged. Deformation indicators were removed and each member was pulled to destruction. Of the group of insulators, swivels, clevices and connecting links tested; not one failed at less than half million pounds tension. Every tension member that went into the 48 insulator assembly was magnifluxed and sustained a tension of twice working load for a period of three minutes for mechanical proof of performance. Before the insulator units were assembled for mechanical testing, the porcelain cones received a sustained 60 cycle and high frequency high voltage test to detect internal defects. From these cones only the best were hand picked for NAA use. After the cones were cemented and cured for a period of 5 days they received the mechanical tension test.



Insulator unit in test position. In foreground are a two million volt impulse generator (left) and 250,000 volt radio frequency transformer which is driven by a 3KW, VLF transmitter.

Having passed mechanical tests the units were prepared for electrical testing. All metallic parts of the insulator units were filed and buffed to remove casting ridges and galvanize burrs in critical areas. The units were then placed in a hot saline solution for a period of 20 minutes to simulate the worst possible effects of contamination. After being rinsed and dried they were moved into a copper lined cubical and hoisted into position for electrical testing. Here, the unit was held at 70 KV and 85 KV for one minute intervals with polarity in one direction and then the other. If the noise exceeded 30 microvolts at 70 KV or if the unit flashed over at 85 KV the unit was rejected for further cleaning. Each and every one of the 768 insulator units in NAA passed the required mechanical and electrical tests.

However trivial these details appear to be, only through their control could 50% efficiency, mechanical and electrical reliability be realized. The giant trigger will be operational about the middle of 1961. It will be an engineering accomplishment of the first magnitude of which all its participants can be proud. NAA is only one accomplishment and only one integral part of a complex web of national defence.



Hey, Professor, how am I supposed to read this watt-meter when it's full of smoke?

FACULTY PAGE

Associate Professor Morris s. Ojalvo is another newcomer to the School of Engineering faculty. Professor Ojalvo is a native of New York City where he received his Bachelor of Science in Mechanical Engineering at Cooper Union College. He has a Master's in Mechanical Engineering from the University of Delaware and has only to complete a thesis and final examinations for his doctorate.

Professor Ojalvo's technical and industrial experience includes a tour of duty in the Navy as an electronics technician during World War II, a position as research assistant at the Pennsylvania State College Engineering Experimental Station and consulting for the Aeroballistics Design and Operations Division of the Naval Ordnance Laboratory while at Maryland University. Also while at Maryland, Professor Ojalvo held summer positions with Boeing Aircraft and North American Aviation. During his time at Purdue University he was project supervisor of an Army group studying transient temperature disturbances in gun barrels.

Professor Ojalvo comes to George Washington well qualified to fill his teaching position. He has previously taught thermodynamics at Purdue, mechanical engineering at the University of Delaware and the University of Maryland, and physics at the University of Illinois.

Professor Ojalvo is married and has three children. His leisure activities are hiking, traveling, and listening to jazz and musical comedy.

Although a newcomer to the faculty of the School of Engineering, Mr. Robert M. Moore is not new to the university. A native of Washington, Mr. Moore attended George Washington from 1955 to 1959. He received a Bachelor of Science in Engineering with a physics option. He is presently working on his master's degree.

Mr. Moore's industrial experience includes working for the Washington electronics firm of Jansky & Baily on problems of radio frequency interference. While a student at the university, he spent his summers as a draftsman for the Construction Division of the General Services Administration.

During his years at George Washington, Mr. Moore was a staff writer for MECHELECIV, manager of Davis-Hodgkins House, and served on the Engineers Council. He is a member of Sigma Tau, Theta Tau and Sigma Pi Sigma.

In his spare time Mr. Moore enjoys golf, tennis and writing fiction.

Stepping boldly across new thresholds, DECO pioneers in:

- **Hardened antennas and communications systems**
- **Substrata communications**
- **Inverted ionosphere**
- **"Lithocom"**
- **Space communications**

For participation in advanced projects, qualified engineers are invited to write DECO Director of Technical Personnel, Fort Evans Road, Leesburg, Va. For further information about DECO capabilities write for our brochure.

Through this open door to previously unexplored frontiers, DECO proudly contributes to the nation's advancement in communications technology with these recent achievements: *Communications Moon Relay* (NAVY) . . . *Tapered Aperture Horn Antenna* (TAHA) (ARMY SIGNAL CORPS) . . . *VLF Radiation System* (NAVY), *World's Largest Transmitting Facility* . . . *World's Largest Radio Telescope* (PUERTO RICO) (CORNELL U.—AIR FORCE).

from the core of the earth to the surface of the moon and beyond

DECO *Developmental Engineering Corporation*

WASHINGTON, D. C. • LEESBURG, VA. • BOULDER, COLO. • BOSTON, MASS.

Edited by Jim Jennings

Quartz Cell Will Measure Rocket Thrusts

A new 510 Quartz Load Cell, featuring high capacity, excellent repeatability and utmost rigidity in a small package, has just been introduced by Kistler Instrument Corp., Tonawanda, N. Y.

Although basically a dynamic instrument for measuring changes in load, accurate static measurements are possible over a few minutes time interval, making it ideal for rocket engine thrust measurements.

Measuring less than 3/4" diameter by 3/4" long, the 510 deflects less than .001 inch under a rated maximum load of 5000 lbs. One-hundredth of a pound variation in load can be measured at any level from 0 to 5000 lbs.

Static pressure signals, caused by loads existing before a measurement, can be eliminated by momentarily grounding the signal lead. Basically designed for compressive forces, the 510 will also measure very small tensile forces, as it has a preload on the crystal. With a special tension adaptor, however, it can be converted readily for measuring large tensile forces.

Atomic Jewelry

Gadgets that measure the radiation exposure of atomic workers look strangely like items of personal jewelry, reports Chemical Engineering. Beta-gamma dosimeter tubes are clipped into workers' pockets like fountain pens, film badges clip on to lapels like brooches, and jet-like black finger rings measure radiation dosage to the hands.

Mechanical Fish Studied

Scientists are using mechanical fish to find out why fish move through the water ten to twelve times more efficiently than anything man can build, Control Engineering reports. The mechanisms simulate movements of fish under various wave conditions.

Aluminum From Coal

If an Ohio coal mine's plans to build an aluminum sulfate plant materialize, the North American continent will gain an important source of aluminum, declares Chemical Engineering. Along with coal, the mine each year produces millions of tons of 20-25 percent alumina-bearing shale that have been previously discarded as waste.

Mystery Heat Resistor

An English plastics firm has announced discovery of an unidentified family of polymers that retain their strength at temperatures as high as 1,110 F., according to Chemical Engineering. Anything over 500 F. has been considered outstanding for plastics. Applications for the new materials are expected in missiles and high speed aircraft.

Thrust Reverser Permits Shorter Landing Strips

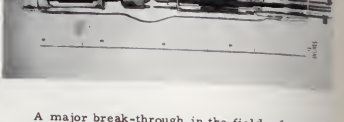
Rohr Aircraft Corporation, Chula Vista, California, has developed a thrust reverser for Lockheed's JetStar. Thus, this new executive jet can land at airports that have relatively short landing strips.

This in effect, enhances the value of jet travel for industry executives since, in many instances, it enables them to land closer to their destination rather than seek out a large metropolitan airport. Distance and time between airport and appointment are reduced.

Reversal of a jet engine's thrust — which could loosely be compared to an automobile brake — is obtained by closing across the path of the exhaust two clamshell doors which, when closed, divert the thrust upward and downward at a forward angle. The result is a substantial slowing-down of a plane without a marked cutback in engine power, permitting a jet to land on a shorter runway.

One-inch Fall Fatal

A missile may fail in its mission because a worker on the assembly line let a part drop one inch on a workbench, American Machinist Metalworking Manufacturing, reports. Tests show that when instruments fall one-to-three inches, forces up to 20 times those of gravity strike them, and the results are sometimes disastrous.

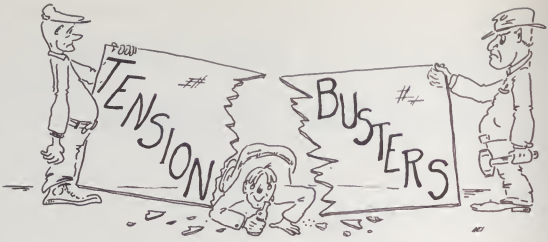


A major break-through in the field of xenon high brightness, long-range illumination has been achieved by the Duro-Test Corporation in cooperation with the United States Army Engineer Research and Development Laboratories. The xenon bulb is said to be the most advanced light source in existence to date.

Xenon high pressure, high brightness bulbs are a new type of powerful lamp for military use, searchlights, projectors and space applications. The rays of the xenon lamp can be projected for a distance of 50 miles.

In one "envelope," the bulb has three brilliant arc discharges spaced approximately one-quarter of an inch from the other, differing in this way from one-arc conventional lamps. The availability of the three closely spaced arcs, which can be switched and regulated independently, makes the lamp particularly useful for military and space applications, as well as commercially.

Some of the advantages of the xenon bulb over carbon lamps are the clean, maintenance-free operation; no open flame; no carbon fumes; perfect daylight color of light, and long-life of up to one thousand hours. This compares with the present necessity of replacing carbons in carbon arc lamps at much shorter intervals.



1st Coed: "Does your boy friend have ambitions?"

2nd Coed: "Oh yes, ever since he's been knee high."

★

I serve one purpose in this school
On which no man can frown.
I quietly sit in every class,
And keep the average down.

★

Applicant: "I'm Gladys Zell."

Personnel Manager: "I'm happy myself. Have a seat."

★

She: "Have you heard about the new college game?"

He: "No, what is it?"

She: "Button, button, here comes the housemother."

★

Her lips quivered as they approached his. His whole frame trembled as he looked into her eyes. Her chin vibrated and his body shuddered as he held her close to him.

The moral of this: Never kiss a girl in a jeep with the engine running.

★

A canny Scot was engaged in an argument with the conductor as to whether the fare was to be five or ten cents. Finally the disgusted conductor picked up the Scot's suitcase and tossed it off the train just as they were crossing a long bridge. It landed with a mighty splash.

"Hoot man," screamed the Scot, "first you try to rob me and now you've drowned my little boy."

★

A half breed is a man with a cold in one nostril.

★

The elevator was tightly jammed when a girl said fiercely: "Take your hands off me, you louse. No, not you! You!

★

Coed: The nimblest man on campus is the one who can shift gears in a Volkswagen without getting his face slapped.

★

The plumber was introducing his new assistant to the niceties of the trade.

"Above all," he said, "you must exercise politeness and tact."

The assistant allowed as how he understood about politeness but, "What is tact?"

"Well, son," he replied, "it's this way. If you walk into a bathroom to fix a pipe and a young lady is in the tub, you close the door and say, "Beg your pardon, sir.' The 'Beg your pardon' is politeness. The 'sir' — that's tact."

★

A C.E. approached a cigar counter and said, "I usually smoke that brand in the can."

"That's the best place to smoke that brand," replied the sweet young thing behind the counter.

★

He: "Please."
She: "No."
He: "Just this once."
She: "No."
He: "Aw, Ma, all the kids are going barefoot."

★

Have you heard the new radio program . . . the girl who wanted two bathrooms, or . . . The wife's other John.

★

E.E. "What to go steady?"
She: "Oh, yes."
E.E. "Ever try castor oil?"

★

"Did you get home from the party all right last night?"

"Fine, thanks, except that as I was turning into my street some idiot stepped on my fingers."

★

"There's a woman peddler at the door."

"Show him in and tell him to bring samples with him."

★

Relative humidity is best demonstrated when you hold your baby in your lap.

An expectant father phoned the doctor to rush right over. "Is she laboring?" asked the doctor.

"Hell no," replied the man. "She's in bed yelling her head off and I'm doing all the work."

★

Progress is so great these days that the liberal artist who says it can't be done is generally interrupted by an engineer doing it.

★

He: I understand kisses speak the language of love.

She: Yes?

He: Let's talk things over.

★

"Your girl is spoiled, isn't she?"

★

"No, it's just the perfume she's wearing."

★

There are a lot of couples who don't neck in parked cars. The woods are full of them.

★

Stage hand: "I hear you and the leading lady are on the outs."

Electrician: "Yea, it was one of those quick change scenes with the stage all dark. She asked for her tights, and I thought she said lights."

★

A sign in a Durham store read as follows: "Our lingerie is the finest. Smart women wear nothing else."

★

They say that girls are minors until they are 18; then they are gold-diggers.

If your sights are set on research and development–

Jet heat blast of more than 15,000 degrees Fahrenheit flares over surface of an experimental nose cone shape in a physics laboratory of Avco Research and Advanced Development Division, Wilmington, Mass.

–you'll find **Photography at Work** with you

RESEARCH and development engineers find photography one of their most versatile tools. Camera and film can record the readings of instruments—can capture for study the fleeting transient on the oscilloscope face. The content and structure of metals can be studied by photospectrography or x-ray diffraction. And stresses in parts are visualized by photographing plastic models with transmitted polarized light.

There's hardly a field on which you can set your sights where photography does not play a part in simplifying work and routine. It saves time and costs in research, on the production line, in the engineering and sales departments, in the office.

So in whatever you plan to do, take full advantage of all the ways photography can help.

CAREERS WITH KODAK:

With photography and photographic processes becoming increasingly important in the business and industry of tomorrow, there are new and challenging opportunities at Kodak in research, engineering, electronics, design, sales, and production.

If you are looking for such an interesting opportunity, write for information about careers with Kodak. Address: Business and Technical Personnel Department, Eastman Kodak Company, Rochester 4, N. Y.

EASTMAN KODAK COMPANY
Rochester 4, N. Y.

Kodak
TRADE MARK

One of a series*

Interview with General Electric's
Charles F. Savage
Consultant—Engineering Professional Relations

How Professional Societies Help Develop Young Engineers

Q. Mr. Savage, should young engineers join professional engineering societies?

A. By all means. Once engineers have graduated from college they are immediately "on the outside looking in," so to speak, of a new social circle to which they must earn their right to belong. Joining a professional or technical society represents a good entree.

Q. How do these societies help young engineers?

A. The members of these societies —mature, knowledgeable men— have an obligation to instruct those who follow after them. Engineers and scientists—as professional people—are custodians of a specialized body or fund of knowledge to which they have three definite responsibilities. The first is to *generate* new knowledge and add to this total fund. The second is to *utilize* this fund of knowledge in service to society. The third is to *teach* this knowledge to others, including young engineers.

Q. Specifically, what benefits accrue from belonging to these groups?

A. There are many. For the young engineer, affiliation serves the practical purpose of exposing his work to appraisal by other scientists and engineers. Most important, however, technical societies enable young engineers to learn of work crucial to their own. These organizations are a prime source of ideas — meeting colleagues and talking with them, reading reports, attending meetings and lectures. And, for the young engineer, recognition of his accomplishments by associates and organizations generally heads the list of his aspirations. He derives satisfaction from knowing that he has been identified in his field.

Q. What contribution is the young engineer expected to make as an active member of technical and professional societies?

A. First of all, he should become active in helping promote the objectives of a society by preparing and presenting timely, well-conceived technical papers. He should also become active in organizational administration. This is self-development at work, for such efforts can enhance the personal stature and reputation of the individual. And, I might add that professional development is a continuous process, starting prior to entering college and progressing beyond retirement. Professional aspirations may change but learning covers a person's entire life span. And, of course, there are dues to be paid. The amount is graduated in terms of professional stature gained and should always be considered as a personal investment in his future.

Q. How do you go about joining professional groups?

A. While still in school, join student chapters of societies right on campus. Once an engineer is out working in industry, he should contact local chapters of technical and professional societies, or find out about them from fellow engineers.

Q. Does General Electric encourage participation in technical and professional societies?

A. It certainly does. General Electric progress is built upon creative ideas and innovations. The Company goes to great lengths to establish a climate and incentive to yield these results. One way to get ideas is to encourage employees to join professional societies. Why? Because General Electric shares in recognition accorded any of its individual employees, as well as the common pool of knowledge that these engineers build up. It can't help but profit by encouraging such association, which sparks and stimulates contributions.

Right now, sizeable numbers of General Electric employees, at all levels in the Company, belong to engineering societies, hold responsible offices, serve on working committees and handle important assignments. Many are recognized for their outstanding contributions by honor and medal awards.

These general observations emphasize that General Electric does encourage participation. In indication of the importance of this view, the Company usually defrays a portion of the expense accrued by the men involved in supporting the activities of these various organizations. Remember, our goal is to see every man advance to the full limit of his capabilities. Encouraging him to join Professional Societies is one way to help him do so.

Mr. Savage has copies of the booklet "Your First 5 Years" published by the Engineers' Council for Professional Development which you may have for the asking. Simply write to Mr. C. F. Savage, Section 959-12, General Electric Co., Schenectady 5, N. Y.

***LOOK FOR** other interviews discussing: Salary • Why Companies have Training Programs • How to Get the Job You Want.

GENERAL ELECTRIC